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	APPLICANT JEWELL, Jack L.		
	FILING DATE August 7, 2002	GROUP 2828	

			U.S. Pa	tent Documents			
Examiner Initial		DOCUMENT NUMBER	DATE	Name	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AL.		4,144,101	Mar., 1979	Rideout.	A		
200		4,216,036	Aug., 1980	Tsang	11		
OM _		5,115,441	May, 1992	Kopf, et al.	$\perp \perp$		
2N		5,115,442	May, 1992	Lee, et al.			
(M)		5,171,703	Dec., 1992	Lin et al.			
%		5,179,567	Jan., 1993	Uomi, et al.			
SM		5,245,622	Sept., 1993	Jewell, et al.	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\	
on		5,258,990	Nov., 1993	Olbright, et al.		<u> </u>	
ew.		5,262,360	Nov., 1993_	Holonyak, Jr. et al.		1	
an		5,327,448	Jul., 1994	Holonyak, Jr. et al.	ļ	<u> </u>	
M		5,337,074	Aug., 1994	Thornton	1		
(m)		5,354,709	Oct., 1994	Lorenzo et al.	<u> </u>		,
LW		5,359,618	Oct., 1994	Lebby et al.	<u> </u>		
Town		5,373,522	Dec., 1994	Holonyak, Jr. et al.			
qu.		5,400,354	Mar., 1995	Ludowise et al.		1. 1	
(M)		5,403,775	Apr., 1995	Holonyak, Jr. et al.			
SW	Ш_	5,416,044	May, 1995	Chino, et al.			
DW.		5,493,577	Feb., 1996	Choquette et al.			
al		5,550,081	Aug., 1996	Holonyak, et al.		ļ	1
no		5,557,627	Sep., 1996	Schneider, Jr. et al.			
(IL		5,568,499	Oct., 1996	Lear		<u> </u>	1
1712		5,581,571	Dec., 1996	Holonyak, Jr. et al.			
NR	Ш	5,594,751	Jan., 1997	Scott			
<\P		5,633,527	May, 1997	Lear	ļ	ļ <u>.</u>	<u> </u>
4hu		5,659,193	Aug., 1997	Ishigaki.			
-W	Ш	5,719,891	Feb., 1998	Jewell			
ew.		5,719,892	Feb., 1998	Jiang, et al.	_	ļ	
LW		5,724,374	March, 1998	Jewell		ļ	
4v		5,729,566	March, 1998	Jewell			
ne	Ш	5,739,945	Apr., 1998	Tayebati.		-	
ak	\coprod	5,809,051	Sept., 1998	Oudar			
an	\coprod	5,896,408	April, 1999	Corzine, et al.			
SWS	Γ	5,978,408	Nov., 1999	Thornton			

aw	$\overline{\Lambda}$	6,014,395	Jan., 2000	Jewell		
on		6,014,395	Jan., 2000	Jewell		
77		6,052,399	Apr., 2000	Sun		
411		6,069,908	May., 2000	Yuen et al.		
48		6,148,016	Nov., 2000	Hegblom et al.		
40	7					

		Other Documents (Including Author, Title, Date Pertinent Pages, Etc.)
Z.	1	Babic et al., "Room-Temperature Continuous-Wave Operation of 1.54-mm Vertical-Cavity Lasers," IEEE Photonics Technology Letters, vol. 7, pp. 1225-1227 (Nov. 1995).
ļ	$\vdash\vdash$	Blum et al., "Electrical and Optical Characteristics of AlAsSb/GaAsSb Distributed Bragg
A.	 	Reflectors for Surface Emitting Lasers," Applied Physics Letters, vol. 67, pp. 3233-3235
	11	(Nov. 1995).
 -	\vdash	Caracci et al., "High-Performance Planar Native-Oxide Buried-Mesa Index-Guided AlGaAs-
Se .		GaAs Quantum Well Heterostructure Lasers," Applied Physics Letters, vol. 61, pp. 321-323
2	\	(Jul. 20, 1992).
	1	Cheng et al., "Lasing characteristics of high-performance narrow stripe InGaAs-GaAs
SIL.		quantum-well lasers confined by AlAs ntive oxide," IEEE Photonics Technology Letters, vol.
62		8, pp. 176-178 (Feb. 1996).
	 	Choquette et al., "Cavity Characteristics of Selectively Oxidized Vertical-Cavity Lasers,"
(M	1/	Applied Physics Letters, vol. 66, pp. 3413-3415 (Jun. 1995).
	H	Choquette et al., "Fabrication and Performance of Selectively Oxidized Vertical-Cavity
-7NV		Lasers," IEEE Photonics Technology Letters, vol. 7, pp. 1237-1239 (Nov. 1995).
ļ — —	+	Choquette et al., "Low Threshold Voltage Vertical-Cavity Lasers Fabricated by Selective
NA	11	Oxidation," Electronics Letters, vol. 30, pp. 2043-2044 (Nov. 1994).
———	1	Choquette et al., "Continuous wave operation of 640-660nm slectively oxidized AlGaInP
Er.	11	vertical-cavity lasers," Electronics Letters, vol. 31, pp. 1145-1146 (July 6, 1995).
	T	Choquette et al., "Self-pulsing oxide-confined vertical cavity lasers with ultralow operating
~a~		current," Electronics Letters, vol. 32, pp. 459-460 (Feb. 29, 1996).
	TT	Chua et al., "Planar Laterally Oxidized Vertical-Cavity Lasers for Low-Threshold High-
Zar.	11	Density Top-Surface-Emitting Arrays," IEEE Photonics Technology Letters, vol. 9, pp. 1060-
1		1062 (Aug. 1997).
	П	Chua et al., "Low-threshold 1.57mm VC-SELs & using strain compensated quantum wells
111	11	and oxide/metal back mirror," IEEE Photonics Technology Letters, vol. 7, pp. 444-446 (May,
		1995).
2		Cibert et al., "Kinetics of Implantation Enhanced Interdiffusion of Ga and Al at GaAs-Gal-
Cyr.	$oldsymbol{ol}}}}}}}}}}}}}}}}}}$	xAlxAs Interfaces," Applied Physics Letters, vol. 49, pp. 223-224 (Jul. 28, 1986).
₹M.		Coldren et al., "Dielectric apertures as intracavity lenses in vertical-cavity lasers," Applied
<"	↓↓_	Physics Letters, vol. 68, pp. 313-315 (Jan. 15, 1996).
	11	Dallesasse et al., "Hydrolyzation Oxidation of AlxGal-xAs -AlAs-GaAs Quantum Well
\$		Heterostructures and Superlattices," Applied Physics Letters, vol. 57, pp. 2844-2846 (Dec.
	44	1990).
	11	Dallesasse et al., "Native-Oxide Masked Impurity-Induced Layer Disordering of AlxGal-xAs
M	11	Quantum Well Heterostructures," Applied Physics Letters, vol. 58, pp. 974-976 (Mar. 4,
	44	1991).
M.		Dallesasse et al., "Native-Oxide Stripe-Geometery AlxGal-xAs -GaAs Quantum Well
	++	Heterostructure Lasers," Applied Physics Letters, vol. 58, pp. 394-396 (Jan. 28, 1991).
SI	11	Dallesasse et al., "Native-Oxide-Defined Coupled-Stripe AlxGal-xAs -GaAs Quantum Well
<u> </u>	++-	Heterostructure Lasers," Applied Physics Letters, vol. 58, pp. 834-836 (Feb. 25, 1991).
N.	Π	Dallesasse et al., "Stability of AlAs in AlxGal-xAs-AlAs-GaAs Quantum Well
ļ	++-	Heterostructures," Applied Physics Letters, vol. 56, pp. 2436-2438 (June 11, 1990).
ZW.	11	Dapkus et al "Ultralow threshold vertical cavity surface emitting lasers," http://engine.ieee.org/pubs/newsletters/leos/dec95/ultra.htr, pp. 1-7.
	1 1	I inthinengine isee of Schoolie water a least coaldee a a little intro her it is

4M	j	Deppe et al., "Very-low-threshold index-confined planar microcavity lasers," IEEE Photonics Technology Letters, vol. 7, pp. 965-967 (Sept. 1995).
LAC		El-Zien et al., "Native-oxide coupled-cavity AlxGal-xAs-AlAs-GaAs quantum well heterostructure laser diodes," Applied Physics Letters, vol. 59, pp. 2838-2840 (Nov. 25, 1991).
40		Evans et al., "Edge-Emitting Quantum Well Heterostructure Laser Diodes with Auxillary Native-Oxide Vertical Confinement," Applied Physics Letters, vol. 67, pp. 3168-3170 (Nov. 1995).
20		Floyd et al., "Scalable etched-pillar, AlAs-oxide defined vertical cavity lasers," Electronics Letters, vol. 32, pp. 114-116 (Jan. 18, 1996).
IN		Floyd et al., "Comparison of Optical Losses in Dielectric-Apertured vertical-cavity lasers," IEEE Photonics Technology Letters, vol. 8, pp. 590-592 (May, 1996).
En		Giaretta et al., "A Novel 4x8 Single-Mode Independently Addressable Oxide-Isolated VCSEL Array," IEEE Photonics Technology Letters, vol. 9, pp. 1196-1198 (Sep. 1997).
on .	\sqcap	Hadley et al., "Comprehensive numerical modeling of vertical-cavity surface-emitting lasers," IEEE Journal of Quantum Electronics, vol. 32, pp. 607-616 (April, 1996).
<u> </u>	\vdash	Hayashi et al., "Record low-threshold index-guided InGaAs/GaAlAs vertical-cavity surface-
Su.		emitting laser with a native oxide confinement structure," Electronics Letters, vol. 31, pp. 560-562 (March 30, 1995).
CN,		Hayashi et al., "Lasing characteristics of low-threshold oxide confinement InGaAs-GaAlAs vertical-cavity surface-emitting lasers," IEEE Photonics Technology Letters, vol. 7, pp. 1234-1236 (Nov. 1995).
M		Hegblom et al., "Estimation of scattering losses in dielectrically apertured vertical-cavity lasers," Applied Physics Letters, vol. 68, pp. 1757-1759 (March 25, 1996).
Nor		Huffaker et al., "Native-oxide defined ring contact for low threshold vertical-cavity lasers," Applied Physics Letters, vol. 65, pp. 97-99 (July 4, 1994).
M		Huffaker et al., "Low threshold half-wave vertical-cavity lasers," Electronics Letters, vol. 30, pp. 1946-1947 (Nov. 10, 1994).
and .		Huffaker et al., "Improved mode stability in low threshold single quantum well native-oxide defined vertical-cavity lasers," Applied Physics Letters, vol. 65, pp. 2642-2644 (Nov. 21, 1994).
U		Huffaker et al., "Lasing characteristics of low threshold microcavity lasers using half-wave spacer layers and lateral index confinement," Applied Physics Letters, vol. 66, pp. 1723-1725 (April 3, 1995).
en		Huffaker et al., "Threshold characteristics of planar and index-guided microcavity lasers," Applied Physics Letters, vol. 67, pp. 4-6 (July 3, 1995).
M		Huffaker et al., "Spontaneous coupling to planar and index-confined quasimodes of Fabry-Perot microcavities," Applied Physics Letters, vol. 67, pp. 2594-2596 (Oct. 30, 1995).
TM		Huffaker et al., "Fabrication of high-packing-density vertical cavity surface-emitting laser arrays using selective oxidation," IEEE Photonics Technology Letters, vol. 8, pp. 596-598 (May, 1996).
N.		Jewell et al., "Surface-Emitting Lasers Break the Resistance Barrier," Photonics Spectra, vol. 27, pp. 126-130 (Nov. 1992).
Un-		Kish et al., "Native-Oxide Stripe-Geometry In0.5(AlxGa1-x) 0.5P-In0.5Ga0.5P Heterostructure Laser Diodes," Applied Physics Letters, vol. 59, pp. 354-356 (Jul. 15, 1991).
74		Kish et al., "Dependence on Doping Type (p/n) of the Water Vapor Oxidation of High-Gap AlxGa1-xAs," Applied Physics Letters, vol. 60, pp. 3165-3167 (Jun. 22, 1992).
4		Kish et al., "Low-Threshold Disorder-Defined Native-Oxide Delineated Buried-Heterostructure AlxGa1-xAs -GaAs Quantum Well Lasers," Applied Physics Letters, vol. 58, pp. 1765-1767 (Apr. 22, 1991).
TIP	1	Kish et al., "Planar Native-Oxide AlxGal-xAs -GaAs Quantum Well Heterostructure Laser Diodes," Applied Physics Letters, vol. 58, pp. 1765-1767 (Apr. 22, 1991).
a a		Koyama et al., "Wavelength Control of Vertical Cavity Surface-Emitting Lasers by Using Nonplanar MOCVD," IEEE Photonics Technology Letters, vol. 7, pp. 10-12 (Jan. 1995).
Cal.		Krames et al., "Buried-Oxide Rigid-Waveguide InAlAs-InGaAsP (I~1.3mm) Quantum Well Heterostructure Laser Diodes," Applied Physics Letters, vol. 64, pp. 2821-2823 (May 23, 1994).
Z.M.		Krames et al., "Deep-Oxide Planar Buried-Heterostructure AlGaAs-GaAs Quantum Well Heterostructure Laser Diodes," Applied Physics Letters, vol. 65, pp. 3221-3223 (Dec. 19, 1994).
AW		Lear et al., "Selectively oxidised vertical cavity surface emitting lasers with 50% power conversion efficiency," Electronics Letters, vol. 31, pp.208-209 (Feb. 2, 1995).
Tra		Lear et al., "Modal analysis of a small surface emitting laser with a selectively oxidized

Jan.

		waveguide," Applied Physics Letters, vol. 66, pp. 2616-2618 (May 15, 1995).
+	•	
No:	- 1	Lear et al., "High frequency modulation of oxide-confined vertical cavity surface emitting
``		lasers," Electronics Letters, vol. 32, pp. 457-458 (Feb. 29, 1996).
UM.	- 1	Lear et al., "Index guiding dependent effects in implant and oxide confined vertical-cavity
du		lasers," IEEE Photonics Technology Letters, vol. 8, pp. 740-742 (June, 1996).
Aur	1	Lee et al., "Wet oxidation of AlAs grown by molecular beam epitaxy," Applied Physics
	1	Letters, vol. 65, pp. 2717-2719 (November 21, 1994).
		MacDougal et al., "Ultralow threshold current vertical-cavity surface emitting lasers with
-M	1	AlAs oxide-GaAs distributed bragg reflectors," IEEE Photonics Technology Letters, vol. 7,
4/	1	pp. 229-231 (March, 1995).
	+	MacDougal et al., "Electrically-pumped vertical-cavity lasers with AlxOx-GaAs reflectors,"
th	1	
<u>v</u>	+	IEEE Photonics Technology Letters, vol. 8, pp. 310-312 (March, 1996).
CAL.	١	MacDougal et al., "Wide-bandwidth distributed bragg reflectors using oxide/GaAs
4/11		multilayers," Electronics Letters, vol. 30, pp. 1147-1149 (July 7, 1994).
, [1	Maranowski et al., " AlxGal-xAs -GaAs-InyGal-yAs Quantum Well Heterostructure Lasers
4		with Native Oxide Current-Blocking Windows Formed on Metallized Devices," Applied
	- 1	Physics Letters, vol. 64, pp. 2151-2153 (Apr. 18, 1994).
	T	Maranowski et al., "Native Oxided Top- and Bottom-Confined Narrow Stripe p-n AlyGal-
14		yAs -GaAs-In.sub.x Ga.sub.I-x As Quantum Well Heterostructure Laser," Applied Physics
`		Letters, vol. 63, pp. 1660-1662 (Sep. 20, 1993).
4M		Ochiai et al., "Kinetics of thermal oxidation of AlAs in water vapor," Applied Physics Letters,
4 11.		vol. 68, pp. 1898-1900 (April 1, 1996).
	\dashv	Ries et al., "Photopumped Room-Temperature Edge- and Vertical-Cavity Operation of
		AlGaAs-GaAs-InGaAs Quantum Well Heterostructure Lasers Utilizing Native Oxide
and the second		
		Mirrors," Applied Physics Letters, vol. 65, pp. 740-742 (Aug. 8, 1994).
2Nr		Rogers et al., "Influence of cavity tuning on the transverse mode in vertical-cavity lasers,"
	$-\!$	IEEE Photonics Technology Letters, vol. 7, pp. 238-240 (March, 1995).
(u		Sugg et al., "Native Oxide-Embedded AlxGal-xAs -GaAs-InxGal-xAs Quantum Well
	_	Heterostructure Laser," Applied Physics Letters, vol. 62,m pp. 1259-1261 (Mar. 15, 1993).
.0		Thibeault et al., "Reduced optical scattering loss in vertical-cavity lasers with thin or tapered
ans		oxide apertures," IEEE Lasers and Electro-Optics Society Annual Meeting, Post-Deadline
		paper PD2.1, (Oct. 30 û Nov. 2, 1995).
0	1	Thibeault et al., "Reduced optical scattering loss in vertical-cavity lasers using a thin (300+)
ANG.	- 1	oxide aperture," IEEE Photonics Technology Letters, vol. 8, pp. 593-595 (May, 1996).
_		Yang et al., "Ultralow threshold VCSELs fabricated by selective oxidation from all epitaxial
NP.		structure," Conference on Lasers and Electro-Optics, Post-Deadline paper CPD4, (May,
,		1995).
	\top	Yang et al., "Ultralow threshold vertical-cavity surface-emitting lasers obtained with selective
KNV		oxidation," Electronics Letters, vol. 13, pp. 886-888, (May 25, 1995).
	+-	Yang et al., "Influence of mirror reflectivity on laser performance of very-low-threshold
Luc		vertical-cavity surface emitting lasers," IEEE Photonics Technology Letters, vol. 7, pp. 1228-
`		
		1230 (Nov. 1995).
Fac. Advisor		11 141
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